

Powerful New Technique

Electron Beams Guided by Lasers

For the first time, electron beams can be shot in a straight line through a gas — thanks to a “rifle barrel” of invisible laser light.

It's the first conclusive demonstration that an intense electron beam can be guided through a gas by a tubelike, ionized plasma channel created by an ultraviolet laser.

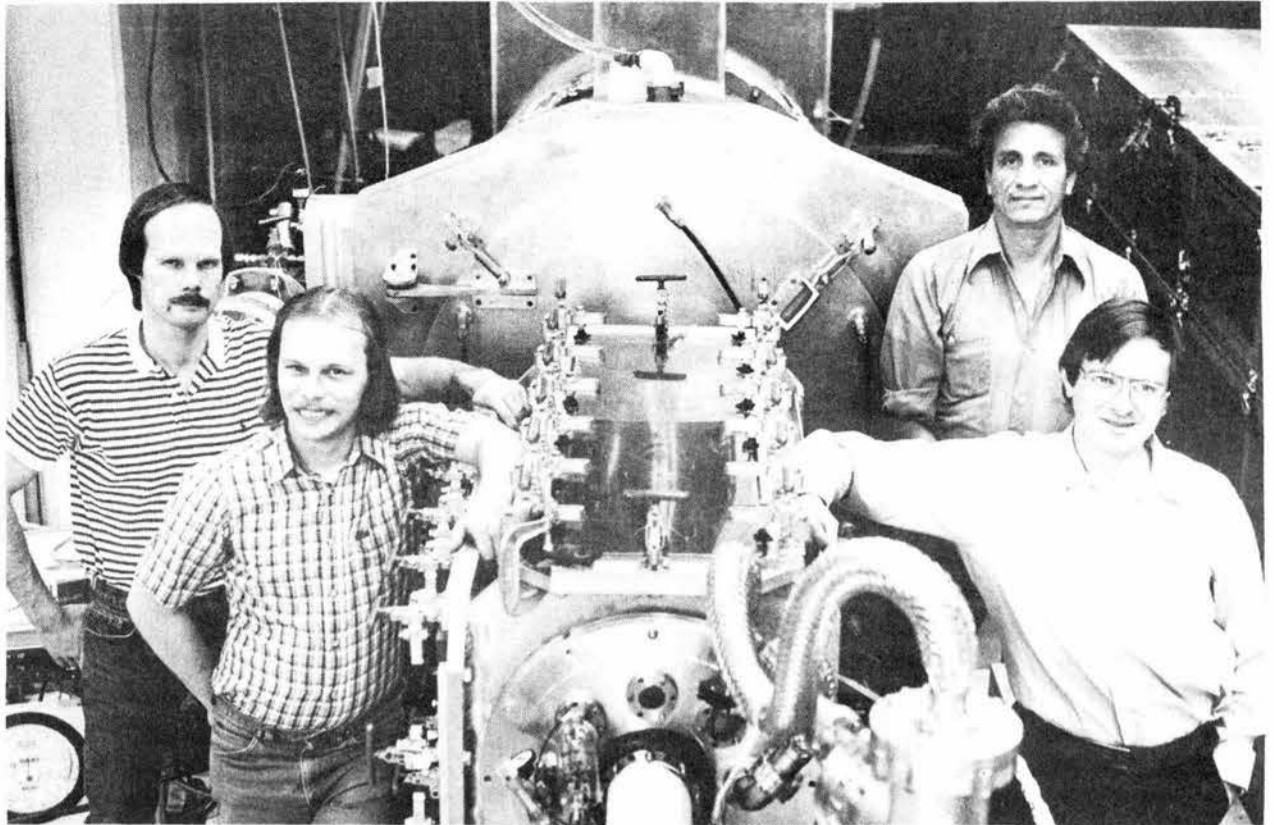
The achievement — recently demonstrated by a project team in High-Energy Beam Physics Division 1272 — could be important in the development of directed energy, or beam, weapons, as well as in other fields ranging from fusion energy research and nuclear weapons simulations to radiography.

The experiments demonstrate that an electron beam can be controlled and transported. “We now have a powerful technique for guiding electron beams efficiently,” says Bruce Miller, manager of Directed Energy Research Department 1270.

Researchers have long sought ways to guide electron beams. But the search was difficult: electrons are negatively charged particles, and, because they all have the same charge, they repel each other. Therefore, a beam of these particles is extremely unstable and difficult to propagate in a vacuum. Within just a short distance the electrons spray out in all directions.

“But it turns out that electron beams can be made to propagate through a gas,” says Bruce, who first advanced the new concept. “In a gas, the beam repels the electrons that are created as it ionizes the gas. And the ionization prevents the beam electrons from repelling each other.”

A project team — Gordon Leifeste, Charles Frost, and technicians Charles Crist (all in High-Energy Beam Physics



MIMI AND PROJECT TEAM provided first conclusive demonstration that an intense electron beam can be guided by an annular ionization channel made by an ultraviolet laser. MIMI is a modified Maxwell Poco-Beam electron beam source; a tubular laser beam was introduced in foreground while the electron beam was accelerated from the rear of the device. Windows at top and sides permitted photo documentation of the achievement. From left, Gordon Leifeste, Charles Crist (both 1272), John Leija (Missouri Research Lab), and Charles Frost (1272). Concept for the experiment came from Bruce Miller (1270) when he was supervisor of High-Energy Beam Physics Division 1272.

Division 1272 supervised by Carl Ekdahl, Jr.) and John Leija (Missouri Research Lab) — was formed to explore the concept.

In their experiments, light from an ultraviolet laser created an annular (tubular) ionized channel in a low-pressure gas. The energy of the laser light stripped electrons off the gas's atoms along the line of its passage. A few billionths of a second later an accelerator injected an electron beam into the channel. The conducting plasma channel guided the high-energy

electron beam, just as a metallic pipe would, by magnetic repulsion from “image currents” (currents equal and opposite to the flow of the electron beam) that flow in the gas.

A series of such experiments was successful in guiding the electron beam in a straight line to a small detector at the end of a five-foot-long experimental chamber.

The beam was stable, and the efficiency of its transport (the amount of current ex-
(Continued on Page Seven)



LAB NEWS

VOL. 37 NO. 6

SANDIA NATIONAL LABORATORIES

MARCH 29, 1985

Classen Addresses 8000

Important Missions in a Changing World

In his 1985 State of the Labs speech last week, Vice-President Dick Claassen (8000) highlighted Livermore's outstanding programs, described outside forces that are bringing about changes and new challenges for Sandia, and outlined his views of what the future may hold for the Labs.

In discussing some of the programs that have brought recognition and credit to Sandia, he first mentioned the embedded atom method, a theoretical technique developed by Mike Baskes and Murray Daw (both 8341) that helps provide a new understanding of atoms and their interactions. Their calculations can be applied to Sandia's work with tritium and may provide insight into how best to store the substance.

Other projects Dick singled out include the pumping limiter being tested in West Germany's magnetic fusion energy program by Art Pontau (8347), George Thomas

(Continued on Page Three)



DICK CLAASSEN (8000) addressed Livermore employees last week.

Antojitos

An Anonymous Challenge Last week when I dutifully joined my fellow brethren and cistern in reading the Security Brief on "Proper ID Badge Display," I noted that we SNLA folks are to wear our badges "at DOE/AL, at LANL, and more remote locations like Livermore." Having been stationed at Sandia Livermore for a while, I read that last phrase with a certain sense of foreboding. Sure enough -- that afternoon's mail brought, anonymously (the coward), the challenge my subconscious self had tried to avoid: How remote is it?

Sandia Livermore is so remote --that you have to hire guides and bearers at the San Francisco airport to get there. --that people from "The City" pack water when they plan to drive there. --that LLNers think Sandia Livermore is Sandia Albuquerque's Site 300. --that Johnny Carson doesn't arrive until 11:30 p.m. but their 8 a.m. is at 7:30.

Slightly more seriously (but not much), I wonder whether the LLNers retain the rather cavalier attitude toward badge-wearing rules they held when I was part of Sandia Livermore in the late 70s. You would have thought that their pre-clearance investigations had taken seven years and included trial by combat, electro-shock treatments, massive daily doses of Nembutal, and sending one child to the FBI as a hostage. Whatever the reason, those folks were proud of their badges. You'd find badge-wearers in the grocery stores, the city library, the bars. I suspect they wore them at weddings, bar mitzvahs, and the bedroom. And when their final day arrived, I'm sure they'd ordered a special pocket in the casket silk for their precious badge.

* * *

Speaking of DOE/AL -- Whatever happened to good old ALOO? Pronounced al-oo, it was the acronym for Albuquerque Operations Office, and it had a fine Swiss-yodeler ring to it. Then it was ALO, but pronounced AL-oo, and it was still at least recognizable as an acronym. Now it's officially AL. Must be tough to work over there: When the folks downtown ask you, "Whoja work for?" you've got to say "AL." And they've got to ask, "Big Al over at the tire shop? Al Monte?" Oh, well, if we can extrapolate from the existing data, in three more years, it will be just A; and three years later it will disappear entirely. Question: Where ya work? Answer: ●BH

* * *

En la tierra a que fuiste, haz lo que viste. (Spanish: In a foreign country, do as the natives do, or "When in Rome . . .")

Art Davie Named 3000 VP

Art Davie, Executive Vice President of Gold Star Semiconductor, Ltd. (an AT&T affiliate located in Seoul, South Korea), will join Sandia on April 1 as Vice President Administration 3000. He succeeds Ray Powell, who retired on Feb. 28.

Mr. Davie received a BS in economics from Villanova University in 1962, an MBA from Centenary College (La.) in 1980, and an MS in management from Stanford University in 1981 under the Sloan Fellowship Program.

He began his career with Western Electric in 1963 in the Finance Division at the New York Headquarters. He was named department chief of Auditing at Hawthorne in 1969 and, in 1970 and 1971, participated in the annual audit of Sandia Laboratories. Since then, Mr. Davie has had a number of assignments, serving as department chief of Planning for the Switching Division, department chief of Production Control at Northern Illinois Works, assistant operating manager at the Montgomery Works, assistant staff manager of the C&W Division in Atlanta, assistant manager of Planning in the Finance Division in New York, Comptroller at the Shreveport Works, Operating Manager at Columbus Works, and his current assignment in South Korea.

He is a member of the National Association of Accountants and received the Certificate in Management Accounting in December 1981. Mr. and Mrs. Davie have three sons -- John, a freshman at Colby College (Maine), Matthew (15), and Christopher (12).

Sympathy

To Bill Geck (3153) on the death of his father in Albuquerque, March 20.

To Ben Johnson (314) on the death of his stepmother in Del Rio, Texas, March 18.

He's Got a Little List

Bob Austin: Speaker Seeker

Bob Austin, coordinator of the Speakers Bureau for Community Relations Division 3163, needs volunteers with a message.

He's looking for employees who are willing to address local area audiences on a variety of topics: careers, an ongoing project, accomplishments or expectations of a division or project team, community projects, hobbies or avocations.

You tell Bob what you're interested in talking about and he'll match you up with a

Murder by Digits



Swedish authorities have revealed that a computer has "killed" thousands of citizens. It will take hundreds of hours and cost several million pounds to resurrect the slain Swedes, from Boraas county. The accident happened when a computer operator innocently keyed a request to the country's computer to update its records, and take account of recent deaths. Unfortunately registers of people in Sweden are based on a six-digit number and a four-digit number, each linked by a hyphen. In defence of its mass murder, the computer only did what it was instructed to do. It interpreted the hyphen as a minus, subtracted the second number from the first, and was left with an unintelligible figure. The computer rejected these figures as obsolete and erased the records from its memory. The records, and lives, of all these Swedes are now being reinstated manually.

—New Scientist

requester—elementary schools, professional societies, church groups, service clubs, and others.

"Some of the most frequent requests received are for speakers on nuclear energy, solar energy, fusion research, lasers, robotics, and careers in chemistry, physics, and engineering," Bob says. "But we have requests for speakers on almost any subject."

If you're hesitant about offering your services because of no previous speaking experience, don't let that stop you. Workshops on designing presentations for particular audiences will be provided. You'll have a chance to practice your talk before giving it to a group for the first time.

Give Bob a call on 4-3931 to sign up or obtain additional information.

Congratulations

Jeannie and Tim Lucero (3462), a daughter, Krystle Hope, March 12.

Stephanie and Steve Ulibarri (3155), a son, Javan Steve, Feb. 11.

Elvira and Jose Guillen (322), a son, Cristian, March 15.

LAB NEWS

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SANDIA NATIONAL LABORATORIES

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Important Missions, Changing World

(8341), and others; studies in the combustion research labs that look into ways to reduce engine pollutants; and the outstanding technical success in designing the first large-scale solar central receiver power plant.

Two current programs with promising futures, he said, are the W87 (the warhead for the MX), whose development schedule is being compressed for national policy reasons, and the Strategic Defense Initiative (SDI), which involves many Sandia people. At a recent meeting at Sandia Livermore to review SDI work, DOE officials complimented Sandia for contributions already made.

"The world is changing and we have to change with it," Dick said. "For example the federal funding situation, including the large federal debt, may affect us. The continuing reductions in funds for energy research mean that Sandia must trim its work in such programs as solar. At the peak of our energy programs, we were devoting about 17 percent of our efforts to energy, but that figure has now dropped to 10 percent and will probably go lower," Dick noted. That is the main reason Livermore's remaining solar programs will be shifted to Albuquerque where work is continuing at the Central Receiver Test Facility. The people in solar programs at Livermore will be assimilated into other SNLL projects during the next two to three years.

Dick explained that Sandia's philosophy of growth, in contrast to some other national laboratories, has always been a conservative one. "Therefore, even though the Labs [both locations] will probably have 150 fewer employees on roll by next year, we won't need any reduction in force — normal attrition will be enough. Livermore will be at about 1070 people." (That's about 20 fewer than at present.)

New programs coming to Sandia this year include reimbursables from agencies outside DOE, mostly from the Department of Defense (DoD). "There is considerable desire for non-nuclear 'smart weapons' to achieve the same functions as some nuclear weapons," Dick noted. "Sandia is going to be involved in developing these new technologies because we have technical capabilities that don't exist in very many places."

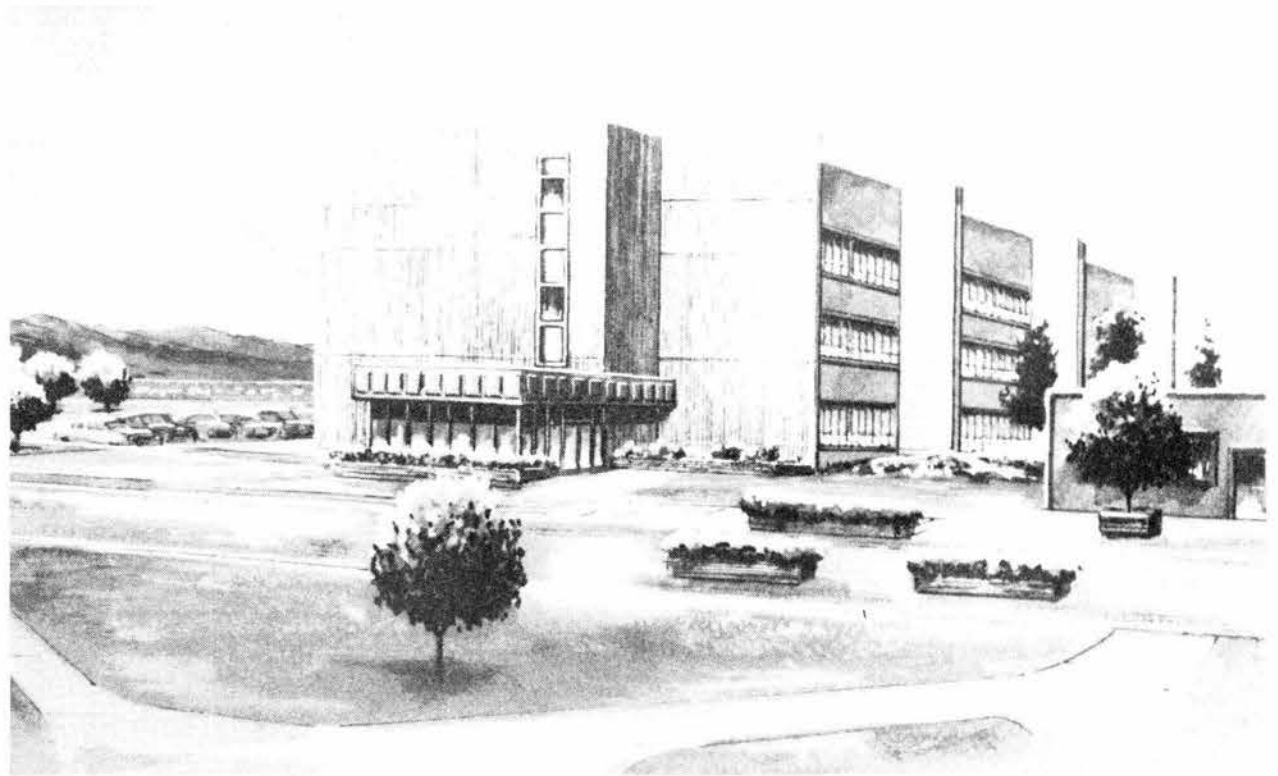
The DOE and the Army have already issued a Memorandum of Understanding that calls for the DOE to do millions of dollars of research in support of Army programs. And there is funding coming from the DoD in connection with more SDI work.

Death

DOROTHY HAGEN of Medical (8026) died March 16 after an illness. She was 65.

She was a nurse at Sandia Livermore for the past 10 years.

Survivors include her husband, a son, daughter, and three grandchildren.



GROUNDBREAKING is set for noon on April 10 for this \$20.1 million Weapons Lab at Sandia Livermore. The new facility will house weapons program R&D and related offices. The steel-reinforced concrete structure has three stories above ground plus a basement and totals 77,000 square feet. Completion is slated for early 1987 with occupancy by that summer.

Even some work at the Combustion Research Facility can be applied to problems that are pertinent to the DoD.

"I'm optimistic that we will continue to obtain the funding for challenging work for our people, important work that will have an impact outside the laboratory," Dick added.

"On a general plane the Livermore Lab looks to be in a good situation — we have our new weapons laboratory starting construction in a couple of months. This is our first building in 25 years supported through Military Applications, an indication in a

very concrete way of support from headquarters. Beyond that, we also have something that is extremely important and productive; that is, we have people who can work together so that this site operates as one organization.

"Most significant of all, this laboratory has very important missions in the national scheme, and all of us can feel that we are working on things that are of direct importance to this country," Dick concluded. "I think that makes a difference to each of us."



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FORTY-TWO PARTICIPANTS made the first Sandia Recreation Committee-sponsored racquetball mixer in March a successful event. Winners were (from left) Bill Rorke (8131), second in novice class; Frank Bielecki (8173), second in men's competition; Dan Hardin (8173), third in novice; Linda Barncord (8235), second in women's competition; Mary Clare Stoddard (8471), an organizer of the event; Peggy Sattler, a guest who placed third in women's; Bob Kee (8245), first in men's; and Ralph James (8341), first in novice. Not pictured is Carolyn Pura (8164), first in women's division.

New Theory for Studying Physics of Surfaces

Electrons are the "glue" that holds solids together. Exactly how they perform this function, especially on a surface, can be a perplexing question. Over the last dozen years, Mike Knotek (1134) has found some new — and hitherto unknown — ways of seeking answers.

He's now ending a distinguished career at Sandia to take on the challenge of directing the National Synchrotron Light Source at Brookhaven National Lab on Long Island (see related story).

As a staff member in the research organization 1000 and, more recently, as the supervisor of Surface Physics Division 1134, Mike has pioneered a new understanding of how atoms are bonded together at the material surfaces. Specifically, he has developed a new way of looking at the mechanisms that cause atoms to break apart in the presence of ionizing radiation.

His work involves two closely related techniques: electron- and photon-stimulated desorption (the opposite of absorption) — or "de-bonding" — of surface atoms. Electron or photon beams are directed against a surface, thus exciting some of the surface electrons and causing atoms and molecules to be repelled — desorbed.

"No other techniques can tell us so precisely where specific species are bonded," says Mike. "This information provides insight into the electronic and geometric structure of the bonding site. This structure determines the chemical reactions and physical properties inherent in the material surface.

"We have explored two important avenues of work at Sandia," Mike continues. "Both will continue after I leave. In one, we're using these techniques analytically to study complex surfaces, such as those that support catalysts, and how materials behave in a corrosive environment. In the other, we're gaining further insight into the physical processes of radiation-induced bond breakage and alteration."

Much of this activity traces back to 1975 when Mike was studying the desorption mechanisms that occur when titanium dioxide surfaces are exposed to ionizing radiation. These studies showed that — contrary to then-current theory — desorption was caused by ionizing particles whose threshold energies did not correlate with the known excitation energies of the bonds on the material surface.

In other words, these chemical bonds apparently were being broken by a process other than the simple absorption of energy from an ionizing particle. An explanation was needed. Mike and Peter Feibelman (1151) subsequently proposed a new theory that successfully explained Mike's results.

A rapidly expanding interest in surface physics — in new materials and radiation-hardening — has made this theoretical work of great importance. The study of electronic properties has been particularly affected.

Key to the new theory was a better understanding of two distinct kinds of electrons — bonding electrons, which hold the atoms of the solid together but are weakly bonded to the parent atom; and core electrons, which are very strongly bonded to the parent atom and which are not sensitive to the presence of neighboring atoms.

The revelation that desorption was generally caused by excitation of the core electrons caused a stir when it was announced by Mike and Peter in 1978 — until then, scientists had believed that desorption was caused by direct excitation of the bonding, not the core, electrons. The following year Mike, discovered that photons (from Stanford's Synchrotron Radiation Center) could also be used to initiate desorption — and, because the physics of the excitation process is simpler and the related spectroscopy better understood, provide considerably greater detail about the process than electrons.

"We found that in most cases desorption occurs by excitation of the core electrons of either the bonded species or its bonding-site atom," Mike explains. "This made the desorption data readily interpretable and, in addition, revealed that the data contained a wealth of new information, making desorption a valuable analytical probe of surfaces."

In core ionization, an electron is ejected in response to external excitation, creating a vacancy in the core electron shell. This vacancy is filled by an electron from an outer shell of this or a neighboring atom. Simultaneously, one or more energetic bonding electrons are ejected from the

atom (the so-called Auger effect). The atom is multiply ionized in this process, with the result that it breaks its bonds and desorption occurs.

Ionization of the core level depends on both the electronic and geometric structure of the site. "We've made significant progress in being able to examine the 'real' surfaces encountered in catalysis and corrosion," Mike says. "In addition, we're now able to break bonds on the surface selectively, and perform a kind of 'atomic surgery.'

"In recent work, we have also succeeded in generalizing these models to include a whole class of co-valently bonded materials (those whose atoms share a pair of electrons), organic materials, semiconductors, and the like. The original model dealt primarily with ionically bonded materials. What we're finding now is that the class of multiply ionized and excited states seen in our early work is effective in a very wide range of systems."

The desorption theory has helped researchers here and elsewhere understand how material surfaces respond to ionizing radiation. "At Sandia we are particularly interested in how radiation affects chemical bonding — in other words, in determining which of the bond's electronic properties either enhance or inhibit radiation-induced chemistry or dissociation," Mike points out. "The techniques could be used, for instance, in studying radiation-induced degradation of oxide or organic materials in ionizing environments."

The new theory is also aiding those scientists designing materials with very
(Continued on Next Page)



THIS IS Brookhaven National Lab's National Synchrotron Light Source, which is designed to provide the world's brightest continuous sources of X-ray and ultraviolet radiation. Mike Knotek (1134) becomes its director on April 1.

Knotek Heads for Brookhaven National Lab

On April 1, Mike Knotek, supervisor of Surface Physics Division 1134, becomes the director of the National Synchrotron Light Source at Brookhaven National Lab on Long Island.

At the NSLS, Mike will work with hundreds of members of "participating research teams" from industry, universities, and government labs who use the super-intense X-rays produced by the NSLS in their studies. Some 200 staff and support people are on the NSLS team.

"It's a big change in direction," Mike says. "I'll be involved in materials science research work, just as I have been at Sandia (see accompanying article), but at Brookhaven I'll be less of a researcher, more of an administrator.

"I'll probably miss the day-to-day work in the lab, but I'll be working with an enormous range of experiments and an incredibly wide range of disciplines — medical doctors, biologists, chemists, earth scientists, as well as physicists. And, no matter what the administrative burden, I intend to keep a finger or two in the science pie."

Brookhaven, with about 3500 employees, is one of Sandia's sister DOE labs. It's operated by a consortium of East Coast universities — MIT and some Ivy League schools among them — known as Associated Universities. "Brookhaven is the East Coast answer to the original government lab at Berkeley," Mike points out.

The NSLS is a new facility built expressly to produce X-rays to be used as analytical tools for material science research. It provides the world's brightest continuous sources of X-ray and ultraviolet radiation. It's also the first X-ray facility in the US dedicated for use as a synchrotron light source.

The smaller VUV (vacuum ultraviolet) electron storage ring has 34 experiment stations, the larger X-ray ring has the capacity for about 80 stations with 50 in operation or under construction. For both rings, bursts of electrons are first generated by an electron gun, accelerated to 70 MeV (million electron

volts) by a linear accelerator, and further accelerated to 740 MeV by a booster synchrotron.

The booster then injects the electrons into the VUV ring or into the X-ray ring, where they are accelerated to their final 2.5 GeV (billion electron volts). The high vacuum in each ring allows the electrons to circulate for hours at velocities near the speed of light before being knocked out of their orbit by residual gas atoms.

Synchrotron radiation is produced when the paths of these electrons are made to follow the arcs of the storage rings by dipole magnets. The radiation emitted travels through ports in the storage rings to mirror assemblies or apertures where it is further channeled down two or three experimental beam lines, the point at which the experimenters' work takes place.

Basic and applied studies are currently underway in surface science, photochemistry and photophysics, metallurgy, X-ray microscopy, lithography, crystallography, and other areas.

"I'll spend much of my time overseeing the programs of the research teams and making judgments as to what experimental facilities need to be added — a \$20 million expansion to add some 50,000 square feet of space and six to ten new state-of-the-art beam lines is currently underway," Mike points out.

"But the new position also presents a great opportunity to continue to contribute as a scientist. It's a high leverage position, in other words, from which to help others produce science and to work alone or with others on my own science. In fact, I already have several collaborators lined up, and we're all eager to get started."

Although no one outside of Brookhaven is privy to the process that ended with the choice of Mike as director, he assumes that his recent work as co-chair of a committee was important. That group created a "Planning Study for Advanced National Synchrotron-Radiation Facilities" that set the nation's policy in the field for the next 10 years and defines



MIKE KNOTEK

how best to use existing facilities, including the big one at Brookhaven.

"I'm pleased at Brookhaven's choice of Mike as director of the NSLS," notes Bill Brinkman, vice-president of Research 1000. "But I'm not surprised — Mike has been a leader in the use of synchrotrons to study photo desorption. His work with Peter Feibelman on the fundamental desorption processes was widely recognized." (See related story.)

"And his understanding of the experimental techniques involved in the use of synchrotron radiation and the needs of the users of national facilities in this field gives him outstanding qualifications to become director.

"I'm sure we'll continue to interact with Mike through our ongoing program of research," Bill concludes.

Mike will be accompanied in his move to Long Island by his wife Karen and one of their three children, Heather, who will enter high school there next fall. Evan is in Military Intelligence in the Army at Ft. Bragg; Lisa will remain in Albuquerque where she's a freshman at UNM.

Continued from Preceding Page

specific surface properties — those that permit the use of catalysts to decompose coal to gasoline or alcohol; improved resistance to corrosion and wear; or improved adhesiveness. Better adhesiveness may, for example, lead to development of inexpensive metal films for solar energy reflectors.

"The guidelines for electron- and photon-stimulated desorption analysis are relatively simple and show in a straightforward manner the factors that govern a wide variety of processes," Mike concludes. "Our work could also have an important impact on the design of materials for use in radiation environments, for example, materials used in fusion reactors, materials resistant to electrical breakdown, or more resistant to the radiation encountered in space."

Fun & Games

Running — The Dinosaur Run to benefit the NM Museum of Natural History is a four-miler held in conjunction with the City's dedication and installation of a pentaceratops replica at 10 a.m. on April 6. Race begins at 8 a.m. with start and finish at the Museum (1801 Mountain Rd. NW). Entry is \$5 or \$10 (free T-shirt with the latter); drawings after race for variety of goodies and grand prize — four plane tickets to the Bolder Boulder 10K. Register at most sporting goods stores, or pick up forms in LAB NEWS office. More info from Rick Giron, 766-7211.

Running-Biking — A new event, a "Ride-It, Park-It Relay," is set for Socorro on April 13. The object of the event, sponsored by NM Tech, is for a team of three persons

to relay two bicycles over a 15-mile paved course; each person must run and ride a minimum of one mile. A team's score is the composite time of all three team members. Cost is \$10 per team before event day, \$15 on. For more information, call Jim McCarthy on 505/835-5131 or write him at NM Tech, Socorro 87801. Entry forms are available in the LAB NEWS office.

Paddling — If you're a kayaker, a rafter, a canoeist, or any other flavor of river rat, and you're ready for some organized activity along those wet lines, you can join the Adobe Whitewater Club of NM by sending \$10 (includes 10 issues of the *Wildwater* magazine) to the club, Box 1656, Corrales 87048.



SINCE HIS RETIREMENT IN May 1978, Sandia VP Dick Bice has continued his work in support of the New Mexico Natural History Museum, scheduled to open in December. Building construction is complete and work on the exhibits area is underway. Below, Dick is standing by one of the two major murals that artists are painting for the Age of Giants exhibit area and the Dinosaur Hall.



V-P Bice Plays Key Role

Natural History Museum: From the Prehistoric to the Present

"In the beginning, the interest is always focused on artifacts. You can hold them in your hands and examine them. But shortly the pleasure of seeing or holding an artifact or a fossil wears off—it's not enough. You find yourself wondering about the people who used it or made it, what the environment was like, who were these people, what kind of animal was this? Answering these questions is what archeology is all about. It's the detective story element that is so fascinating. Soon, you begin to perceive a broader picture. The new Natural History Museum will provide that broader picture. It will not compete with others in anthropology but will open your eyes and your mind to the natural history of New Mexico, which is uniquely endowed with the broadest variety of living plants and fossil and animal remains."

These are the words of Dick Bice, retired Sandia vice president and president of the New Mexico Museum of Natural History Foundation.

Dick is in the unique position of seeing the results of years of work and dedication come to fruition in the opening of two major museums—the Albuquerque Museum a few years ago and now the NM Museum of Natural History.

Dick's interest in community affairs and the history of the state is long-standing. In 1954 he was elected to the Albuquerque City Commission and served eight years with that body. He's a charter member of the Albuquerque Archeological Society and a 20-year member of the NM Archeological Society. In the early 60s, Dick was asked by

the city commission to chair a city museum advisory board. On the board's recommendation, the old Airport Building was converted to a temporary museum in 1967. Dick served as chairman of the Board of Trustees through 1978. During that time, he worked on a city museum ordinance; the bond issue was passed, allowing construction of the new museum in 1977.

Appointed by Governor Apodaca to the NM Paleontological Task Force, Dick once again began to delve into the feasibility of establishing a new museum.

"For three years, we studied the fossils of New Mexico and tried to determine what action was required to save them," Dick recalls. "We had several possibilities to consider, the least of which was merely to record fossil discoveries; of course, the best was to construct a natural history museum. In the end, we recommended the museum to the Legislature. The bill came up for consideration during the New Mexico State Prison riot and was delayed. It was salvaged by the heroic efforts of Senators John Irick and Aubrey Dunn, key figures in the Legislative Finance Committee. In 1980 the museum was funded with \$8 million from the State, \$2 million raised in matching funds, and the land provided by the City."

A policy advisory committee and its companion organization, the Museum Foundation, became the prime movers in establishing the museum. Dick has worked with the museum's various task forces and boards for six years, and has been Foundation president for the past three years.

"To me, one of the most exciting aspects of the fund drive is the fact that 60,000

Digs and Analysis, Archeology and Ethics

Dick Bice's interests in museums and in archeology go hand-in-hand — they support one another.

The Albuquerque Archeological Society is active in field projects. They undertake the programs at the request of various state agencies — the Laboratory of Anthropology, the Bureau of Land Management, the Forest Service. One of the on-going programs includes the stabilization and partial excavation of an Indian Pueblo near San Ysidro, now in its sixth year.

Dick has been active in the field schools sponsored each year by the State Archeological Society. The field schools — one on rock art and one on excavation — provide training for amateurs as well as research opportunities. The current project is the excavation of a Great Kiva near Gallup. The Society also publishes a book of collected papers once each year in honor of either a professional or volunteer archeologist. Dick serves on this publications committee and is chairman of the certification council.

He is co-chairman of the field and laboratory committee for the Albuquerque archeology group.

"An archeological dig is exciting," Dick says, "but three to five times as many hours are required in the laboratory as in the field. A small amount of field work piles up a tremendous

amount of analytical work. And the field work can cause considerable damage if it isn't fully recorded and the results published.

"Destruction of sites by humans and machines is a sad fact," Dick continues. "The Federal Antiquities Law is specific on federal lands but the enforcement problem is stupendous. Utah and Arizona and the Mimbres country of New Mexico have incurred terrible losses.

"For years museums were faced with a dilemma—the ethics of purchasing artifacts on the open market so that they could be preserved in the public domain versus allowing them to remain in the private area where public access was limited. Artifacts have an art value, but the scientific value is negligible without an exact provenance [traceable origin or source]. So the museums have decided that they should not act in any manner, such as purchasing, that would encourage the development of a market for artifacts acquired either illegally or unscientifically.

"The answer to the problem is a broad educational effort. If the general public realized [as the museums did] that when they purchase these items, they are encouraging illegal activity and destruction, then there would be no market and no profit for pot hunters."

Special Events Mark Museum Opening

"A Prehistoric Premiere" — a major fund raiser for the Museum of Natural History — will be held during the weekend of April 5, 6, and 7. Activities include a Friday evening gala at the Wool Warehouse and a Saturday evening concert by the New Mexico Symphony Orchestra at the museum. Ticket holders and the general public will see the unveiling and installation of David Thomas' bronze Pentaceratops dinosaur on Saturday morning, April 6 at 10 a.m. in front of the Museum. An open house on Sunday will allow visitors to see the 30' x 40' mural in progress in the Dinosaur Hall as well as other exhibits in progress. They will meet the artists and scientists who have designed the displays.

As a Museum brochure puts it, "The New Mexico Museum of Natural History is the first full-size museum of its kind to

be built in the United States in this century. This spectacular museum will no doubt become New Mexico's greatest human-made attraction when it opens in 1985. Utilizing art, science, and high-technology to achieve its awesome effects, the Museum integrates the prehistoric with the present. From video to holography, murals to monsters, volcanoes to rivers, the design includes techniques never before applied to a museum environment. It is a living museum that stimulates hands-on human interaction, an experience that takes visitors on A Walk Through Time."

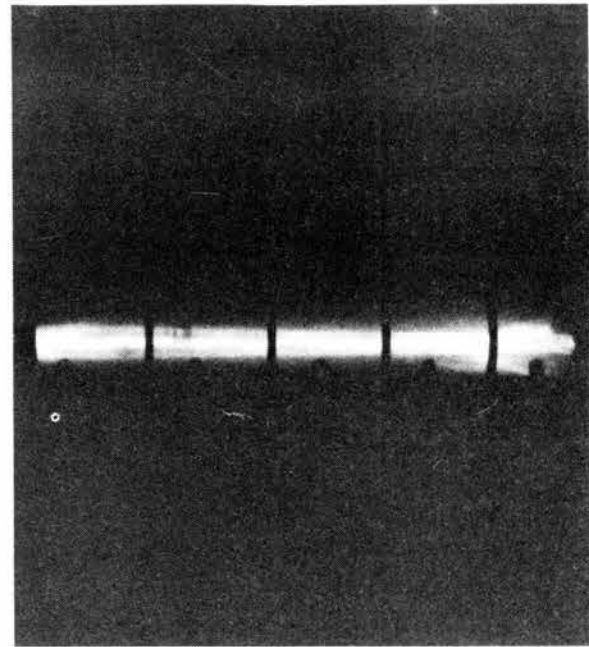
Tickets for the Prehistoric Premiere will be \$100/person (80 percent tax-deductible). For more information call 841-8828. (See Fun & Games for information about the four-mile run to benefit the Museum.)

school children in the state donated one dollar each toward the construction of the museum. Think how the interest of those 60,000 children spreads and touches others—for their entire lives, they'll know that they helped build this museum," Dick says.

Fund raising is the Foundation's most important role. "A state-operated facility cannot be in the business of raising money," Dick says. "So the Foundation takes on that responsibility. In addition, it handles the

membership organization and builds community support.

"We're making good progress. The Museum now has an excellent director and staff. It has curators of zoology, botany, geology, paleontology, exhibits, and education. The outreach activities—traveling exhibits, lectures, and field trips—have been popular. The staff will move into the building April 1, and we expect it will take about nine months to finish the exhibits before opening. It will take a few years to



HISTORY-MAKING PHOTO documents success of an ultraviolet laser in creating an ionization channel (light gray) through low-pressure gas. Gas traps and guides a high-current electron beam (white) injected from left. The beam oscillates within the surrounding channel but is tightly confined by the magnetic force.

Continued from Page One

Laser Guides Electron Beam

iting compared with the amount of current injected) was as high as 80 percent. The team believes that the 20 percent loss in beam current occurs near the injection point and represents electrons with low energy or excess sideways momentum. "I think we'll see little additional current loss even when we transport the beam over longer distances," says Charles Frost.

The experiments used an ultraviolet laser and an electron beam from an electron accelerator known as MIMI. When the electron beam was injected into the laser, photographs of gas fluorescence indicated a straight channel — and proof of the principle. The electron beam was about a million times more energetic than the laser beam that guides it.

The research on laser-guiding of electron beams is part of a multi-laboratory effort to develop technologies to propagate charged particle beams. In addition to Sandia, Lawrence Livermore National Laboratory and the Naval Research Laboratory are working on the challenge.

"The experiments at Sandia and elsewhere are continuing," notes Bruce. "But these results already indicate that laser guidance can be used to make a pulse of electrons propagate in a straight line."

mature, but with the start that's been made, the Museum will develop into a great institution.

"The state has historical, folk art, anthropology, art, and now a natural history museum. Eventually, we need a 'hard science' (physics, math, etc.) museum. This need is partially supplied by the Atomic Museum and the Space Hall of Fame in Alamogordo, but expanding on these or creating a new science museum would complete the picture."

Take Note

Executive Vice President Lee Bray (30) has been appointed to the Board of Directors of United Way of Greater Albuquerque for a three-year term. The board sets UW policies.

* * *

The 1985 Easter Seal Telethon will be carried over KOAT-TV, Channel 7, on Sunday, March 31. Hosted by singing star Pat Boone, the annual drive for funds supports the Easter Seals programs and services for the disabled.

* * *

A free lecture series, "Recent Advances in Mathematics and Statistics," sponsored by UNM, is now underway. The lectures will be given at 3:30 p.m. in Rm. 122 of Northrop Hall, the UNM geology department building. The schedule follows:

April 2, "A Theory of Statistics Built on Massive Computations," Prof. Bradley Efron, Stanford Univ.;

April 9, "The Use of Mathematical Physics in Geometry," Prof. Hermann Flaschka, Univ. of Arizona;

April 16, "Hamiltonian Structures for Fluids, Plasmas, and General Relativity," Prof. Jerrold Marsden, UC Berkeley.

For more information, contact the UNM department of mathematics and statistics.

* * *

Parentcraft, a division of the Family Counseling Service, has published a catalog of new workshops, seminars, and group meetings for parents of infants and toddlers. If you would like a catalog, call 265-8596.

An open house to celebrate the merger of Parentcraft and Family Counseling Service, a United Way agency, will be held March 30 from 9 a.m. to 12 noon at the Parentcraft Center, 114 Carlisle SE. The open house will feature a workshop on Positive Communication in Families from 10 to 11:15 a.m. The workshop is free; childcare will be provided if reservations are made in

advance. Call 265-8596 for more information.

* * *

John Shunny, retired editor of the LAB NEWS, hasn't really retired. Read his article, "New Mexico's High Tech," in the April issue of *New Mexico Magazine*.

* * *

"Technology Along the Rio Grande" is the theme of the 7th annual Electronics Exposition and Symposium to be held at the Convention Center May 7-9. The exposition, sponsored by ISE (Ideas in Science and Electronics, Inc.) with IEEE as co-sponsor of the technical sessions, will feature a variety of technical paper presentations and panel discussions in addition to the trade show exhibits (more than 400 national electronics exhibitors).

Pre-registration deadline is April 15; contact ISE, 9004 Menaul NE, or call 294-6622.

* * *

The Federal Depository Library is a collection of government publications within a currently existing library. Depositories can be Selectives or Regionals. Selectives receive only the publications appropriate to their collections. Regionals receive every available government publication and have the responsibility of retaining this material permanently, on paper or microfiche. The Regionals also provide reference and inter-library loan services within their region.

These Depository Library collections are filled with information on careers, gardening, business opportunities, health and nutrition, energy resources, and countless other subjects.

UNM's General Library is a Regional Depository; the UNM Medical Center Library and the School of Law Library are Selective Depositories. Government publications are available for free use at any Depository Library.

* * *

Join Beta Aloosters Toastmasters Club



Here are a couple of current volunteer opportunities for employees, retirees, and family members. If you would like more information, call Karen Shane (4-3268).

R.S.V.P. (Retired Senior Volunteer Program) needs a calligrapher to prepare a dozen award certificates. Minimal lettering required.

NEW MEXICO HUMAN SERVICES DEPARTMENT is launching a Bernalillo-county-wide recruitment for foster parents. Requirements are love, patience, and the desire to help a child. Expenses are paid by the state.

and overcome your fear of public speaking. The club meets on Mondays at the Coronado Club from 12 noon to 1 p.m. For more information call Ida O'Guinn, 265-0424 or Rich Yoshimura (6323), 294-0224.

* * *

Retiring this month and not shown in LAB NEWS photos are Everett Gieseker (5165), Robert Higgins (2800), Harold Houts (5117), Emilia Perea (5110), Nancy Sanchez (3711), Helen Stake (7000), Floyd Stake (2858), Mae Wood (3313), Secundino Baca (7475), Ed Sims (3435), Tom Laney (7542), and Elsie Upchurch (3313).

Retiring



Andy Landis (3163)



Bill Rowe (3425)



Cliff Magnuson (1522)



Ted Smart (7524)



Jim Park (2361)



Phil Arnold (5215)



Mel Vick (5143)



Bob Pinkham (2542)

Lie Down on the Job Next Tuesday

It's time for some new blood in Sandia Albuquerque's donor program.

The United Blood Services folks are beginning to get "Why me again?" responses from the relative handful of Sandians on their phone list of donors.

And it's true that the list is growing shorter. It's not that the old faithfuls are changing their minds about the need for blood, the ease of giving it, or the psychic rewards that come from giving the community a gift that can be provided no other way. "It's rather that the long-time donors are retiring," says June Rugh (3543), coordinator of Sandia's blood donor program.



BLOOD IS THICKER THAN WATER. Our weebegone fireman needs the latter. But medical emergencies demand blood, and the hydrant is us. Sandians are urged to help keep the pipelines full — none of us knows when blood will be needed.

We're Needed, We're Slipping

As these statistics show, Sandians collectively contribute a lot of blood each year. But the numbers show only the number of pints of blood collected, not the number of donors, and both numbers are going down. The program needs wider participation so it will be less dependent on a relatively small number of donors.

Year	Number of Donations
1974	1075
1975	1219
1976	1754
1977	1932
1978	1645
1979	1652
1980	1682
1981	1554
1982	1396
1983	1545
1984	1318

Yes, that's a lot of blood. But United Blood Services needs a lot of blood — 235 blood donations each weekday to meet the medical needs of 50 hospitals and 1.1 million people in a 900,000 square mile area. The blood donated by a Sandian could save the life of an Apache in Dulce, a rancher in Roswell, or your closest friend.

"And many new — and some old — Sandians haven't yet picked up the blood-donor habit."

Statistics on the number of Sandia donors aren't available. But if the community-wide proportion is accurate, then fewer than 20 percent of us donate more than once a year. But 60 percent of us are eligible donors and could donate blood once every eight weeks.

It's easy to become a donor. Just head for either Medical or Bldg. 822 (most convenient to the thousands of Sandians in the burgeoning southeast part of Tech Area I) any Tuesday between 8 a.m. and 2 p.m. (The Weekly Bulletin now carries the location each week.)

You'll be asked some questions to ensure that no one gives blood who shouldn't (either for the donor's health or for the eventual recipient's safety.) Then you get to lie down on the job — with your boss's blessings — as a pint of blood flows into a sterile container.

Does it hurt? Pinch the skin on your palm between the nails of your thumb and index finger — hard, but only for a second. That's the pain you'll feel as a very slender (really) needle is skillfully put into your arm.

Most donors feel fine after giving blood. A few feel a bit light-headed and want to sit quietly for a minute or two. That's OK — no one is going to pay any attention. The UBS team is gentle, skilled, and unfailingly gracious — and each member is trained to be able to recognize momentary dizziness in any donor and deal compassionately with it.

And afterwards, there's juice — and cookies — and the warm feeling that comes from doing a favor for people who desperately need a favor.

Welcome

- Albuquerque*
 - Kenneth Holley (141)
 - Michael Selph (1234)
 - Lynda White (2631)
- Colorado*
 - James Beals (7842)
- New Mexico*
 - Terry Steinfort (1541)
- Ohio*
 - Michael Spychala (7172)
- Oklahoma*
 - David Hendrick (7832)
- Tennessee*
 - Stanley Fraley (311)
- Wisconsin*
 - James Schaefer (7556)

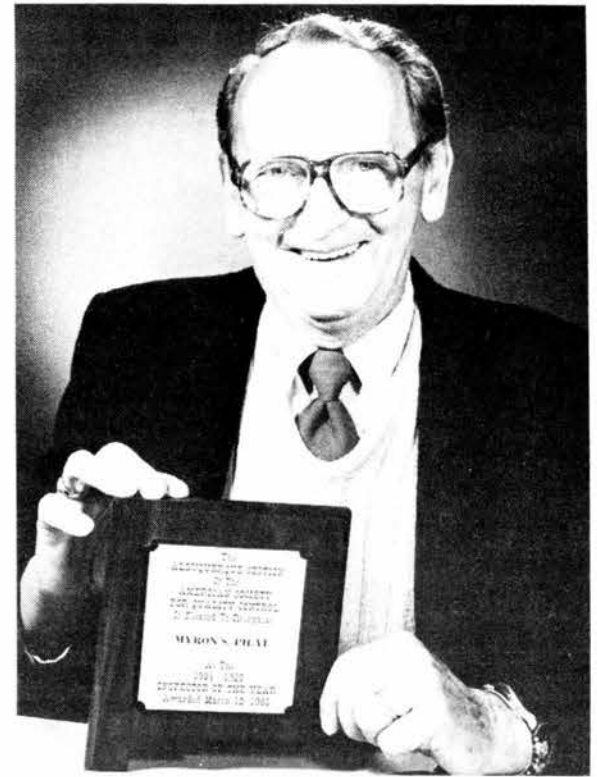
Death



Jim Banas, supervisor of Intelligent Machine Systems Division 6228, died suddenly March 14. He was 40.

He had worked at the Labs since March 1968.

Survivors include his wife and three sons.



MYRON PILAT (7251) displays the plaque awarded this month by the Albuquerque Section of ASQC naming him "Inspector of the Year."

Myron Pilat Honored by ASQC Group

Myron Pilat of Inspection/Acceptance Section 7251-1 was honored this month as "Inspector of the Year" by the Albuquerque Section of the American Society for Quality Control. A field inspector for Sandia's quality assurance organization for 30 years, Myron is currently Sandia's resident inspector at Sparton Technology Inc. in Albuquerque.


Bill Thomas, supervisor of Quality Operations Division 7251, who helped nominate Myron for the award, says that in the past year Myron processed some 3000 weapon components or related WR product valued at more than \$8 million.

"This remarkable record," Bill says, "is a reflection of Myron's capability as an inspector and quality assurance representative. His professional approach to product quality has earned him the respect of his co-workers, both at contractor plants and at Sandia/Bendix. New Sandia inspectors under his leadership and training have progressed well but continue to respect and solicit his advice on product quality matters."

Myron began his career with Sandia as a field inspector in the East Coast Area Office. He has been assigned to contractor production facilities in Cleveland, Chicago, Toledo, Philadelphia, Indianapolis, Baltimore, and New York City.

He operated Sandia's Precision Mechanical Secondary Standards Laboratory at Cherry Hill, N.J., for more than six years. In his 30-year career at Sandia, Myron and his wife Estelle have made 10 major relocations.

Pregnancy: Not For Women Only

 "Researchers now tell us that women are not the only ones who endure morning sickness, quirky appetites and abdominal bloating. At least 25% of expectant fathers also develop the complaints of pregnancy. And often their suffering seems to exceed that of their wives. They are victims of couvade — a syndrome characterized by pregnancy-related symptoms for which doctors can find no physical basis. The problems invariably clear up within nine months, but can recur as soon as their spouses get pregnant again."

Thomas Lee in *American Health*

MILEPOSTS

LAB NEWS

MARCH 1985



John Andersen (5161) 30



Glen Kuswa (1601) 15



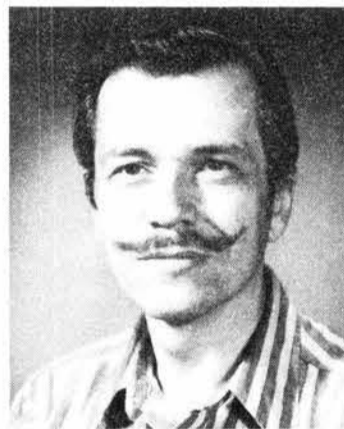
Ted Hebebrand (8262) 20



Pat Conlon (7473) 20



Jose Romero (7818) 15



David Straub (7234) 15



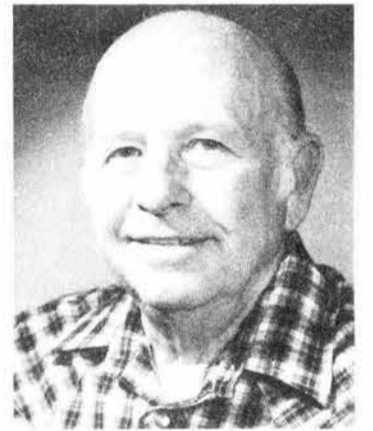
Doyle Baker (8173) 25



Jim Hann (6041) 35



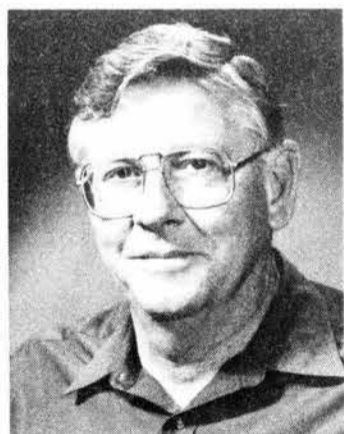
Don Loehle (3424) 35



Robert Seavey (323) 30



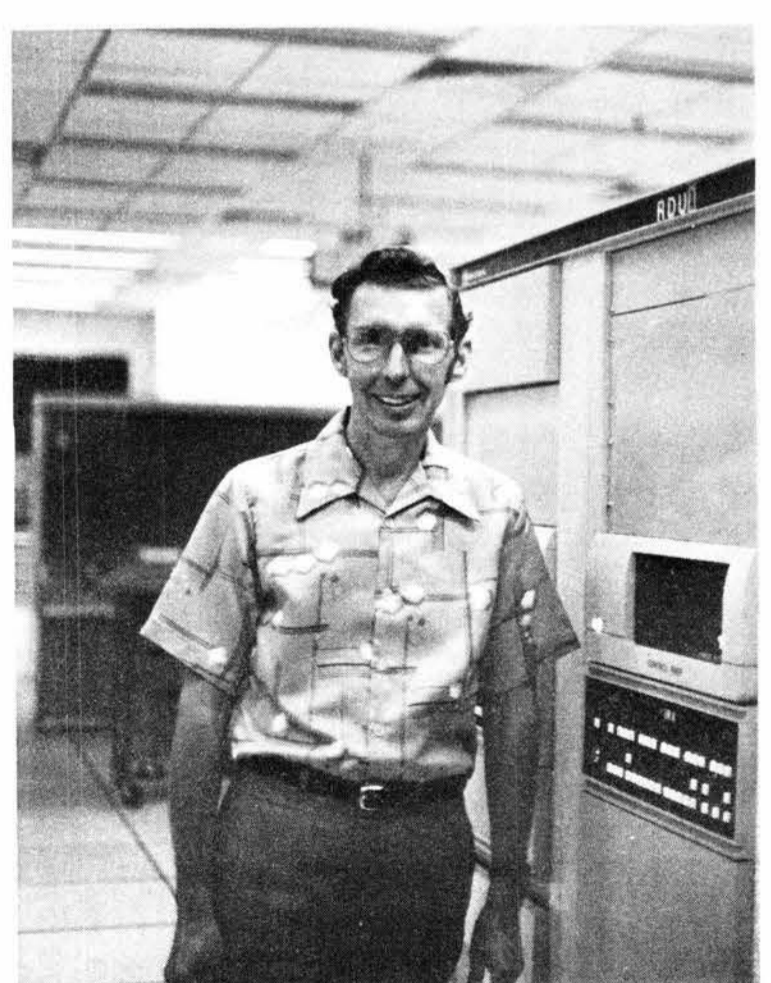
Mary Beth Brown (3741) 30



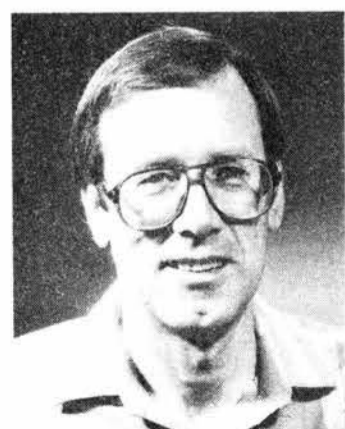
Paul Seward (7135) 30



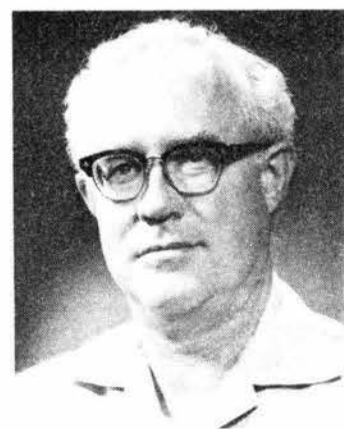
T.J. Williams (2361) 30



Leroy Thomas (5321) 20



Cliff Jacobs (5322) 25



David McCarthy (2526) 25



Marlin Aker (6452) 25

Talent Show, Family Buffet Tomorrow

TONIGHT a group called South Side, billed as a variety band, plays for dancing while the dining room special is your choice of prime rib or snow crab, two-for-one at \$11.95. Reservations are required, but you could call the Club office, 265-6791, right now or drop by after 7:30. The dining room serves from 6 to 9 p.m.; the band plays from 8 to midnight.

TOMORROW is a biggie — on the Coronado Club stage are some dynamite entertainment acts and in the dining room is a buffet designed for family appetites (that means kids) and family pocketbooks (that means very reasonable at \$4.50).

The stage show is a competition with prizes to be awarded. Singers, two groups of dancers, a magician, and musicians will be competing. Retiree (one month now) Charlie Clendenin is emcee.

Everyone on Base is invited. Dinner starts at 6 p.m.; entertainment at 6:45. Make reservations, bring the kids, and c'mon out.

ON FRIDAY, April 5, the Isleta Poor Boys are booked for another night of their popular brand of country-western music. The dining room goes two-for-one filet mignon or fried shrimp for \$12.95. Robin Arquette entertains in the main lounge from 6 to 8 p.m. Free country and western dance lessons are scheduled in the ballroom from 7 to 8.

SAVE SATURDAY, April 6, for the youngsters. The Club's annual Easter Egg Roll is set for 10 a.m. for the little ones six and under. Cartoons will play on the Club's big TV screen, kids will look for hidden eggs, participate in the egg roll contest, and collect prizes. The Easter bunny will drop by. The event is free to members and members' kids, but members only please.

There's no admission for the evening event either — a free movie for families. Walt Disney's *The Jungle Book* will be shown. This is a popular adaptation of some Rudyard Kipling stories with charming animation. Food service starts at 5, cartoons will be shown on the TV from 5 to 6, and the movie starts at 6. Invite a friend — this event is open to all to advertise advantages of Club membership.

EASTER SUNDAY, April 7, will also be a special occasion at the Club with a super Easter brunch from 10 until 2. Chef Henry will deliver an elegant spread with goodies to please everyone — ham, steamboat round of beef, white fish, eggs Benedict, eggs scrambled, a variety of vegetables and beverages, and "a medley of desserts." The tab is \$6.95 for adults, children from two to 12 pay \$3, while little ones two and under are free. Reservations are necessary — call 265-6791 right away.

A TRAVEL PROGRAM on Chaco Can-

Events Calendar

March 29 — NMSO Goes Pop — Hoe-Down at the Symphony with Michael Murphy, 8:15 p.m., Kiva Auditorium, 842-8565.

March 31 — Movietime at the KiMo — Movies by Great Directors, "Wings," William Wellman (1927), 7 p.m., KiMo.

April 1 — Audubon Society Wildlife Film, "The Galapagos," 7:30 p.m., Popejoy, 881-9387.

April 2 — Tenth Anniversary of the Chamber Orchestra of Albuquerque — musical tour of Germany and Austria, 8:15 p.m., Albuquerque Little Theatre, 247-0262.

April 3-14 — "A Midsummer Night's Dream," NM Repertory Theatre, 8 p.m. Wed.-Sat.; 2 p.m. Sat. & Sun., KiMo, 243-4500.

April 7 — Annual Easter Celebration — Cochiti, Jemez, San Felipe, San Ildefonso, Santa Ana, Santa Clara, and Santo Domingo Pueblos. Basket or corn dances; ceremonial foot races and pole climbs. Contact pueblos.

April 8 — The Best of Broadway and International Theater, "Brighton Beach Memoirs," Neil Simon's latest hit comedy, 8:15 p.m., Popejoy, 277-3121.

yon, presented by Joan Mathien, an archeologist member of UNM's Chaco Center, is scheduled Thursday, April 11, at 7 p.m. She will present a slide-illustrated lecture on the Chaco Canyon ruins, Chaco culture, and current studies. The Chaco National Monument encompasses the most extensive ruins of ancient North American civilization extant.

Information will also be presented on the Club-sponsored one-day trip to Chaco on April 20. Cost is \$26, and there might be a few seats left. Call the office, 265-6791, right away.

Another travel program on Hawaii is scheduled in the ballroom on Monday, April 22, at 7:30 p.m. Thunderbird Travel will show films and discuss a possible Club-sponsored trip to the Islands this summer.

In the meantime, you might consider a four-day excursion to Las Vegas by charter bus May 26-29 for \$119 double occupancy. Stop by the travel table on Fridays between 6 and 7 in the Club lobby and talk travel.

ON FRIDAY, April 12, Don Lesmen's big band returns to the Club to play an evening of big band sounds for the entire membership. Lesmen's group played for the recent Thunderbird (Coronado Club retiree group) dinner dance and made a tremendous hit. Lesman's 11-piece orchestra plays the arrangements of Glen Miller, Harry James, and Tommy Dorsey in the swinging big band style. How long has it been since you heard a trombone?

The dining room offers another two-for-one special — either prime rib or scallops for \$12.95. Early reservations for this are a very good idea.

THE THUNDERBIRDS liked Lesman so much they booked him again for the retiree group's Spring Dinner Dance scheduled Saturday, April 27. The event costs \$7 (guests \$8) and includes a roast beef and chicken buffet. Make reservations early.

The Thunderbirds' card players meet at the Club on the first and third Mondays of each month at 10:30 a.m.

Another Thunderbirds group, this one interested in recreation vehicles and camping excursions, will meet April 9 and 10 at the Bosque Arena on North Loop. Chairman Bob Schmedeman has more information; call 299-2077.

Any Thunderbird golfer is invited to join the Sandia Golf Association (SGA). Call Tom Cordova (3711), 844-2888.

SATURDAY, APRIL 13, has been declared SERP Participants' Appreciation Night honoring all those Sandians who participate in Sandia recreation programs — from the Corporate Cup to arts and crafts classes. Recreation manager Stan Ford says this will be a great evening of dining and dancing at reduced prices. Topping the buffet spread (tab: \$4.50) will be grilled-to-order steak, Talisman (a variety group) will play for dancing, and reduced bar prices will be in effect. Open to SERP participants and their guests, reservations are a must. Call 265-6791 to nail down your table.

CASINO NIGHT is coming up on Saturday, April 20. For this one, the Club is converted to Las Vegas on the Rio Grande with casino action all over the place. The only difference is that play money is used. Everything else — especially the excitement — is about the same. Even music. Half & Half, country and western show band, will play from 8:30 to 12:30. Food service, available from 6:30 to 9, includes a selection of sandwiches and a green chile stew special for \$1.35. Members trade \$1 (guests \$2) for a bundle of play money and tickets for prize drawings during the evening. The big prize is a free trip to a mystery destination.

THE SINGLES EVENT this month drew a pretty good crowd and enthusiasm ran high. To squeeze another one into the April calendar took some doing, but it's now set for Thursday, April 18. All singles on Base are invited to stop by after work, enjoy some free munchies, listen to Dunn's Dancing Machine, and move around some in the ballroom.

A LADIES NIGHT OUT is also scheduled on Thursday, April 18, in the dining room area. A Chippendale Jazzercise cassette will be playing on the big TV, free munchies will be spread, and very special bar prices will be in effect.

CORONADO SKI CLUB elected new officers this month. They are Lisa Mondy (1512), president; Carolyn Johnstone, (2625), vice-president; Jim Kadlec (3612), secretary; Jane Moses, treasurer; Kaz Oishi (5151), director; Curt Moses (5151), membership chairman, Steve Ross (1000), publicity chairman; Sharon Mackel (330), trip chairman; and Wes Pfarner (321), area representative.